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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,012	09/25/2003	Kavitha Srinivas	YOR920030251US1 (16768)	7874
23389 7590 04/14/2009 SCULLY SCOTT MURPHY & PRESSER, PC 400 GARDEN CITY PLAZA SUITE 300 GARDEN CITY, NY 11530				
EXAMINER				
DAO, THUY CHAN				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/671,012

**Applicant(s)**

SRINIVAS ET AL.

**Examiner**

Thuy Dao

**Art Unit**

2192

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 February 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,4-7,11,12,15,17-19,21,23 and 24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-7,11,12,15,17-19,21,23 and 24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. This action is responsive to the amendment filed on February 2, 2009.
2. Claims 1, 4-7, 11, 12, 15, 17-19, 21, 23 and 24 have been examined.

### Response to Amendments

3. In the instant amendment, claims 1, 15 and 21 have been amended; claims 23 and 24 have been added.

### Claim Objections

4. Claims 1, 15 and 21 is objected to because of minor informalities.

#### Claim 1:

The examiner notes that the term "physical medium" has not been described/defined in the originally filed disclosure. Accordingly, the phrase in lines 1-2 is considered to read as - -A software tool, embedded in a program storage device, containing machine executable instructions [[stored on a physical medium]] for monitoring ... - - as recited in original independent claim 15.

Line 8 recites "a group of defined coding patterns" and lines 11-12 and 18 recites "the/said group of defined coding patterns". Accordingly, all terms at other locations are considered to read as - -each of the/the defined coding patterns- -.

Lines 14-16, the phrase is considered to read as - ...to insert the [[plurality of]] additional breakpoints into the computer program [[to identify said steps in the group of]] at the [[plurality of]] defined locations...- -.

#### Claim 15:

Similar correction is requested for claim 15.

#### Claim 21:

Similar correction is requested for claim 21.

Furthermore, line 23, the phrase is considered to read as - ...for [[the]] an occurrence of any one of the [[first]] set of defined conditions...- -; and

In line 25, the phrase is considered to read as - -for [[the]] a non-occurrence- -.

Appropriate correction is requested.

### **Response to Arguments**

5. Applicants' arguments have been considered but are moot in view of the new ground(s) of rejection.

### **Claim Rejections – 35 USC § 103**

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 4-7, 15, 17-19, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent Publication No. 2003/0106045 A1 to Arnold et al. (art made of record, hereafter "Arnold") in view of Engler (art of record, "Checking System Rules Using System-Specific, Programmer-Written Compiler Extensions").

#### **Claim 1:**

Arnold discloses a program storage device readable by machine and a software tool containing machine readable instructions stored on a physical medium for monitoring behavior of a running computer program, the software tool comprising:

*a pattern detector manager including machine readable instructions for inserting into a running computer program a main entry breakpoint at one or more defined points in the computer program (e.g., FIG. 4, block 100 "Set breakpoint", [0051]-[0054]); and*

*to insert additional breakpoints into the computer program wherein, upon hitting one of the main entry breakpoints in the computer program, the pattern detector manager inserts the additional breakpoints into the computer program (e.g., FIG. 4, block 106, "Add Creation breakpoint", block 124, "Add breakpoint for each selected creator", [0053]-[0054] and [0059]);*

*the pattern detectors track the inserted, additional breakpoints to detect violations (e.g., FIG. 2, [0039]-[0041], user interface 26, debugger 24; FIG. 5, block 140 "...present debugger information).*

Arnold does not explicitly disclose other limitations. However, in an analogous art, Engler further discloses:

*a plurality of pattern detectors (e.g., col.9: Table 1, a plurality of Rule Templates), each of the pattern detectors being associated with one of a group of defined coding patterns (e.g., col.9, Table 1, examples of code portions in §4.3, §5.2, §5.1, §7, §6.3 as coding patterns),*

*each of the coding patterns including a plurality of steps (e.g., Table 1, "Never do X after Y", step of checking Y exists = True, step of checking whether X exists = True or False, if X exists = True then step of checking X after Y = True or False;*

*col.17, §5.1, a code portion (a coding pattern) having steps to warn when any non-system-call routines use paranoid user-data routines;*

*col.19-20, §5.2, code portions (coding patterns) having steps to detect violations such "not checking the result of memory location", "not freeing memory on error paths";*

*FIG. 4, code portions (coding patterns) having steps to detect violations such as allocated memory is "checked before use", "not used after a free", "not double freed", "always freed on error paths"), and*

*each of said steps being associated with a defined location in the computer programs (e.g., Table 1, specific rule "Do not acquire lock A before B" associated with a first defined location (for example, an instruction for acquiring lock A) and a second*

defined location (for example, an instruction for setting condition B = True), and checking the acquiring operation for lock A is indeed before condition B or not;

col.17, checked code instrumented at specific/defined locations;

col.19-20, checked code instrumented at specific/defined locations;

col.23, checked code instrumented at specific/defined locations).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to combine Engler's teaching into Arnold's teaching. One would have been motivated to do so to maintain specific system constraints and legal orderings of operations and/or particular contexts in which these operations can or cannot occur as suggested by Engler (e.g., col.7: 22-39).

**Claim 4:**

The rejection of claim 1 is incorporated. Arnold also discloses *a debugger for debugging the computer program, and further including a launcher to invoke the pattern detector manager when the debugger is used to debug the program* (e.g., [0039]-[0042] and [0065]-[0068]).

**Claim 5:**

The rejection of claim 1 is incorporated. Arnold also discloses *the pattern detector manager removes the entry breakpoints at specified times* (e.g., [0046]-[0050] and [0057]-[0059]).

**Claim 6:**

The rejection of claim 1 is incorporated. Arnold also discloses *the pattern detector manager removes the entry breakpoints and the further breakpoints at specified times* (e.g., [0042]-[0046] and [0063]-[0067]).

**Claim 7:**

The rejection of claim 1 is incorporated. Arnold also discloses *the pattern detector manager includes means for monitoring for the occurrences of the entry breakpoints* (e.g., [0048]-[0052] and [0069]-[0072]); and

*the pattern detector manager inserts said at least one further breakpoint into the computer program in response to the monitoring means detecting the occurrence of said one of the entry breakpoints* (e.g., [0051]-[0054] and [0072]-[0076]).

**Claims 15 and 17-19:**

Claims 15 and 17-19 are program storage device versions, which recite the same limitations as those of claims 1 and 4-7, wherein all claimed limitations have been addressed and/or set forth above. Therefore, as the reference teaches all of the limitations of the above claims, it also teaches all of the limitations of claims 15 and 17-19.

**Claim 23 (new):**

Arnold discloses *the software tool according to claim 1, wherein the plurality of additional breakpoints inserted into the computer program by each of the pattern detectors are inserted into the computer program sequentially in time* (e.g., FIG. 14, col.23: 1 – col.24: 11; col.24: 47-57; col.66: 20-31).

**Claim 24 (new):**

Engler discloses *the software tool according to claim 23, wherein: for each of the pattern detectors, a first of the additional breakpoints is inserted into the computer program at the first time* (col.7: 22 – col.8: 20), and

*a second of the additional breakpoints is inserted into the computer program only when said first of the additional breakpoints is reached in the computer program* (e.g., col.9: 1 – col.10: 25); and

*the pattern detectors detect said violations during execution of the computer programs and without stopping said execution* (e.g., col.5: 51 – col.6: 42).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to combine Engler's teaching into Arnold's teaching. One would have been motivated to do so to maintain specific system constraints and legal orderings of operations and/or particular contexts in which these operations can or cannot occur as suggested by Engler (e.g., col.7: 22-39).

8. Claims 21 and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morshed (art of record, US Patent No. 6,721,941) in view of Tsai (art of record, US Patent No. 6,161,196) and Engler.

**Claim 21:**

Morshed discloses *a method of detecting code patterns in a computer program that violate a given set of coding rules, the method comprising the steps of:*

*defining a set of coding rules (e.g., col.13: 43-49; col.17: 25-28; col.20: 60-62; col.75: 63 – col.76: 23),*

*each coding rule of the set of the coding rules being associated with a respective one pattern detector of a set of pattern detectors (e.g., FIG. 14, blocks 446, 450, 454, 458, 462, col.23: 1-64; col.13: 40-56; col.19: 13-33);*

*providing a pattern detector manager for managing said pattern detectors (e.g., FIG. 14, blocks 442, 448, 452, 456, 460, 464, col.23: 1 – col.24: 11; FIG. 12, block 410, col.21: 43-54);*

*providing a computer program, and running the computer program in a debug mode (e.g., FIG. 12,col.21: 6-67; col.23: 36 – col.24: 11);*

*the pattern detector manager identifying, during the running of the computer program in the debug mode, points in the computer program that relate to said coding rules (e.g., FIG. 15-17, col.24: 11 – col. 25: 67), and*

*said pattern detector manager inserting into the computer program an entry breakpoint at each of said identified points (e.g., col.20: 40-49; col.20: 63 – col.21: 5);*



*said pattern detector manager invoking each of the pattern detectors to monitor the computer program for a violation of the coding rule associated with said each of the pattern detectors (e.g., col.21: 6-67; col.13: 43-49; col.20: 60-62), including the step of:*

*each of the pattern detectors inserting one or more further breakpoints into the computer program to identify further points in the computer program that relate to the coding rule associated with said each of the pattern detectors (e.g., col.24: 11 – col.25: 67; col.23: 14-22; col.66: 20-31), and*

*tracking said additional breakpoints to determine whether the computer program violates the coding rule associated with said each of the pattern detectors (e.g., FIG. 14, col.23: 1 – col.24: 11; col.20: 6-62);*

*wherein each of said additional breakpoints identifies a respective step in the computer program that is part of the coding pattern associated with said one of the entry breakpoints (e.g., FIG. 14, col.23: 1 – col.24: 11; col.24: 47-57; col.66: 20-31), and*

*wherein each of the pattern detectors monitors the computer program for the occurrence of any one of the first set of defined conditions, the occurrence of which violates the coding rule associated with said each of the pattern detectors (e.g., col.1: 24-36; col.32: 61 – col.33: 27; col.55: 31-47).*

Morshed does not explicitly disclose *monitors the computer program for the non-occurrence of any one of a second set of defined conditions, the non-occurrence of which violates the coding rule associated with said each of the pattern detectors.*

However, in an analogous art, Tsai further discloses *monitors the computer program for the non-occurrence of any one of a second set of defined conditions, the non-occurrence of which violates the coding rule associated with said each of the pattern detectors (e.g., col.10: 58-67).*

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to combine Tsai' teaching into Morshed's teaching. One would have been motivated to do so to declare faults after a maximum wait threshold

(maximum time to reach a specific breakpoint) and avoid the target program to hang indefinitely as suggested by Tsai (e.g., col.10: 58-67, emphasis added).

Neither Morshed nor Tsai explicitly discloses other limitations. However, in an analogous art, Engler further discloses:

*a plurality of pattern detectors* (e.g., col.9: Table 1, a plurality of Rule Templates),  
*each of the pattern detectors being associated with one of a group of defined coding patterns* (e.g., col.9, Table 1, examples of code portions in §4.3, §5.2, §5.1, §7, §6.3 as coding patterns),

*each of the coding patterns including a plurality of steps* (e.g., Table 1, "Never do X after Y", step of checking Y exists = True, step of checking whether X exists = True or False, if X exists = True then step of checking X after Y = True or False;

col.17, §5.1, a code portion (a coding pattern) having steps to warn when any non-system-call routines use paranoid user-data routines;

col.19-20, , §5.2, code portions (coding patterns) having steps to detect violations such "not checking the result of memory location", "not freeing memory on error paths";

FIG. 4, code portions (coding patterns) having steps to detect violations such as allocated memory is "checked before use", "not used after a free", "not double freed", "always freed on error paths"), and

*each of said steps being associated with a defined location in the computer programs* (e.g., Table 1, specific rule "Do not acquire lock A before B" associated with a first defined location (for example, an instruction for acquiring lock A) and a second defined location (for example, an instruction for setting condition B = True), and checking the acquiring operation for lock A is indeed before condition B or not;

col.17, checked code instrumented at specific/defined locations;

col.19-20, checked code instrumented at specific/defined locations;

col.23, checked code instrumented at specific/defined locations).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to combine Engler's teaching into Arnold's teaching. One

would have been motivated to do so to maintain specific system constraints and legal orderings of operations and/or particular contexts in which these operations can or cannot occur as suggested by Engler (e.g., col.7: 22-39).

**Claim 11:**

The rejection of claim 21 is incorporated. Morshed also discloses *a debugger for debugging the computer program, and further including the step of invoking the pattern detector manager when the debugger is used to debug the program* (e.g., col.1: 24-36; col.32: 61 – col.33: 27; col.55: 31-47).

**Claim 12:**

The rejection of claim 21 is incorporated. Morshed also discloses *the step of removing the entry breakpoints at specified times* (e.g., FIG. 14, col.23: 1 – col.24: 11; col.24: 47-57; col.66: 20-31).

**Conclusion**

9. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication should be directed to examiner Thuy Dao (Twee), whose telephone/fax numbers are (571) 272 8570 and (571) 273 8570,

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respectively. The examiner can normally be reached on every Tuesday, Thursday, and Friday from 6:00AM to 6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam, can be reached at (571) 272 3695.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273 8300.

Any inquiry of a general nature of relating to the status of this application or proceeding should be directed to the TC 2100 Group receptionist whose telephone number is (571) 272 2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Thuy Dao/

Examiner, Art Unit 2192

/Tuan Q. Dam/

Supervisory Patent Examiner, Art Unit 2192